Institution Groundwater Management in the United States: Lessons for South Asia and North China

by

Tushaar Shah

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INSTITUTIONAL GROUNDWATER MANAGEMENT IN THE UNITED STATES: LESSONS FOR SOUTH ASIA AND NORTH CHINA

Tushaar Shah[*]

I. INTRODUCTION

In many ways, the United States has been a pioneer in facing the environmental fallout of intensive groundwater irrigation and in devising ways to counter its impact. As a result, the American experience in groundwater management has held a powerful sway over global discussions on how other regions of the world—notably South Asia, North China, Mexico, and Spain—can rein in their runaway groundwater irrigation economies and make them sustainable. This symposium has provided a valuable perspective on institutional groundwater management, particularly from two states, Texas and Kansas, which present contrasting approaches to groundwater management. In this note, my purpose is to share what I learned from the symposium and to offer my impressions of the relevance of these lessons to Asia.[1]

An impressionistic and widely held view outside the United States is that management of groundwater depletion in the American West is primarily based upon reducing withdrawals, usually by reducing areas irrigated with groundwater. For example, one heard that the State of Colorado decommissioned about 1000 irrigation wells by decree; and Idaho purchased water rights from irrigators and closed 2000 irrigation wells. In Colorado, many irrigators had to quit farming or switch to dry land crops, supplemented by non-farm income. In Idaho, groundwater pumping from increased depths became so expensive that the irrigators were more or less ready to have their operations bought out.

By contrast, one also heard that reducing irrigated areas or groundwater withdrawals is more of an exception than a rule; and when groundwater pumping is restricted, it is always in lieu of new imported surface water.

* Principal Researcher, International Groundwater Management Institute, Colombo, Sri Lanka.

1. Other than my impressions, everything herein that follows is based on the participants' presentations. I would like to place on record my debt to the symposium participants for the information presented here.

According to Henry Vaux, a senior economist from University of California at Berkeley, out of 431 groundwater basins in California, only nineteen are "actively managed," implying some restrictions on pumping. In all the other California basins, groundwater management is passive, basically involving federal government grants to build infrastructure to import surface water and supply it to groundwater users in lieu of pumping. In 412 basins, nobody is expected to reduce groundwater use. Professor Vaux also suggested that active management basins are generally overlaid by highly urbanized areas where governments or municipalities can easily buy water rights to serve high paying urban consumers.

I had heard all of this long before I participated in the Kansas symposium. Some of these impressions were confirmed; but others stand revised and refined, based on some extremely informative discussions which I had the opportunity to partake of at the symposium.

II. THE VARIETY OF APPROACHES

What was striking to me as an outsider is the variety of groundwater management approaches in use in different states, especially in their rights doctrines and the role of groundwater districts. Kansas and Colorado have embraced the prior appropriation doctrine, together with groundwater districts as local resource management institutions. Nebraska has groundwater districts but a system of rights based on statutes. New Mexico has prior appropriation but no groundwater districts. Oklahoma and Texas have neither prior appropriation nor groundwater districts. In Oklahoma, groundwater permits are issued by the state. Texas follows the rule of capture and has groundwater districts only in seriously over-developed areas. This great variety in management approaches—their mechanics, doctrines and underlying philosophies—makes it challenging for anyone to glean lessons from the American experience that are useful for other parts of the world. I will merely recapture what I understood are the experiences in Kansas and Texas, for the interesting contrasts they offer.

A. The Kansas Experience

My impression is that Kansas has taken institutional groundwater management very seriously. Three institutions are important for groundwater management in Kansas: the Division of Water Resources (DWR), the Groundwater Management Districts (GMD's), and the Intensive Groundwater Use Control Areas (IGUCA's). Since 1927, DWR and its Chief Engineer have played the role of the custodian of the state's waters. Until 1945, Kansas operated under the doctrine of riparian rights and reasonable use with groundwater. In 1945, after the enactment of the Kansas Water Appropriation Act (KWAA), Kansas switched to the prior appropriation doctrine in assigning groundwater rights. This switch required current users to apply for "vested

rights," and new users to obtain rights through a water use permit. The new act was the first step towards creating real property rights in groundwater, with DWR assuming the responsibility for protecting existing investments in diversion works. In 1957, Kansas completed the task of creating a real property right in groundwater, unlinked to land, and tradable. Since then, Kansas has issued a total of around 30,000 water rights in the form of permits. Each right entitles its owner to withdraw a specified number of acre feet from a particular source for use for a specific purpose on a pre-specified location. It can be sold, but only within a radius of between 1400-2600 feet from the source. In 1978, unauthorized appropriation of water became a criminal offense. Five Groundwater Management Districts created under the GMD Act sought to allow local water users to shape their destiny with respect to the use of groundwater as long as they do not violate the State law. Today, the Chief Engineer and GMD's share several powers, although the former dominates the groundwater scene. GMD's intervene in a variety of ways, by issuing moratoria on new permits, by specifying and enforcing well-spacing rules, by determining allowable depletion criteria, by recommending to the Chief Engineer specific regulations for their domain, by declaring and managing IGUCA's, and by undertaking Aquifer Storage and Recovery projects.

As the apex regulatory organization, DWR has evolved a sophisticated GIS-based system for groundwater monitoring and use. DWR boasts of having evolved the best water reporting system based on annual returns on water use data filed by all of its permit holders. A civil penalty of $250 is levied for failure to report. Kansas collects $40,000 every year as fines, and the compliance rate is as high as ninety-nine percent. DWR also carries out regular quality checks at various locations with support from GMD's.

With this elaborate legal and institutional foundation, Kansas is in a strong position for institutional management of its groundwater. Yet Kansas is part of the High Plains aquifer, which, while it provides seventy percent of its water, is being depleted at the rate of eighteen inches per year on average. In South Asia, sustainability is defined by zero depletion, by limiting abstractions to "safe yield." In Kansas and elsewhere in the United States, the permanent depletion of an aquifer is taken as a *fait accompli*; and so the debate, such as it is, concerns only how rapidly the aquifer is to be depleted. While in some areas of the state with independent aquifers, sustainability is the guiding principle of groundwater governance, in the regions above the Ogallala, *managed* depletion is the key goal.

Several questions arise about the upshot of the Kansas experience. Is the edifice of institutional management worthwhile if all it does is enforce a "depletion formula?" Are irrigator-dominated GMD's little more than foxes guarding the hen house? Do they have the capacity to finance their own operations? Do they have the ability to enforce aquifer management plans against entrenched political interests? Can GMD's break out of their monolithic and agricultural domination and acquire boards with broader

representation? These are hard questions.

B. The Texas Experience

Professor Kaiser of Texas, for one, argued in his presentation that Kansas might be committing administrative overkill in its intensive institutional groundwater management; namely, that it was trying to do administratively what the economics of groundwater depletion would do anyway. Intensive institutional groundwater management does not come cheap; transaction costs of such management are heavy. He argued that Texas, with a far less vigorous groundwater governance regime, was not necessarily any the worse for it; and I found a certain appeal in his logic.

Texas too has vast areas where groundwater is being depleted. Its embrace of the rule of capture allows a land owner to pump at will without incurring liability to other users, as long as the pumping (a) is neither malicious nor wasteful; (b) does not cause subsidence; (c) does not involve a slant well crossing property lines; (d) does not affect the underflow of a river (but the relevant statute does not define the underflow); and (e) is not done in a Groundwater Conservation District. The consequences of the rule of capture are simple: the biggest pump wins, mining is encouraged, and so is transfer out of agriculture; together, these foment political discord and ignore community impacts. But most of these consequences accompany institutional management, too.

Professor Kaiser asked a good question: while Kansas and Colorado are depleting their groundwater, albeit in a "managed" manner, Texas is doing the same in an "unmanaged manner," and is saving the cost and hassle of institutional management. The legislative response to groundwater depletion in Texas has been to let the locals figure it out, except, as in the Edwards Aquifer Authority, the Huston Harrows County Subsidence District, or Kinney County, where serious externalities require state intervention. In the Edwards Aquifer Authority, for example, 844 permits are issued for 545,000 acre feet of water. These are enforced; water police can be called in by a farmer to prevent illegal pumping by neighbors.

Professor Kaiser felt that even in these "managed depletion areas," groundwater management has been disruptive, setting neighbors against each other, and allowing water lawyers to sue and argue their way to the bank. He suggested that intensive institutional management in the United States has produced only one class of winners: water lawyers, who have created a growth industry out of groundwater litigation. Kaiser suggested that the rule of capture is an elegantly simple way of dealing with over-pumping. Survival of the fittest is the criterion. Texas characterizes how groundwater economies operate in India and China.

III. LESSONS WORTHY TO BE TAUGHT?

In sum, with their long history of litigation over groundwater, the western states have seen much institutional and regulatory action to improve groundwater governance. However, it is not at all clear that this litigation has been uniformly helpful. Kansas likely represents the best that institutional groundwater management can achieve; but it is still depleting High Plains aquifer, and it is by no means clear if Kansas is significantly better of compared to Texas, with its open access regime. The role GMD's play in sustainable groundwater management is also by no means clear; they certainly generate information, educate farmers, have fancy GIS systems, and protect small independent aquifers. But in the High Plains aquifer, their role seems doubtful. In much of the United States, taking pressure off of groundwater by importing surface water is a far more common approach than asking irrigators to make sacrifices.

And yet, asking poor farmers in Asia to sacrifice groundwater irrigation to protect aquifers is often the lesson experts offer from the American experience. A battery of researchers and international agencies such as the World Bank have exhorted India and China to establish tradable groundwater rights and the equivalent of GMD's. Quite aside from the fact that the success of these within the United States itself is a subject of much debate, there is also the question of the transactional costs of institutional management. These costs matter. Kansas's 1978 law exempts small users who (a) divert up to fifteen acre-feet of groundwater, (b) are domestic users, and (c) divert water for cattle herds. If such exceptions were applied to Asia, over 95% of the 20 million groundwater diversion points in India and the 7.5 million groundwater diversion points in China would qualify for them, leaving only large industrial and municipal users under the regulatory ambit. And these, in any case, are regulated. If India and China were to undertake institutional management of the Kansas kind, the resources they would need, in terms of money and manpower, would be enormous.

When Professor Peck and I visited the office of DWR in Topeka, he asked an official there how he would like to have twenty million applications for groundwater permits instead of Kansas's present number of 30,000. At first ecstatic at the thought of collecting a $250 fee for each of these applications—a total of five billion dollars—the official's jaw then fell open as he realized, "Gosh, monitoring them would be sheer madness!" As a governance problem, groundwater regulation in South Asia is fundamentally different than institutional groundwater management in the United States. In logistical terms, it is more like stemming the flow of illegal immigrants into the United States, or like keeping the Chinese from using the internet to air their dissent. Yet as it has been said of the Mastodon, a beast once common to both Asia and North America but now long extinct, so too may it be said of groundwater management: "that which is not learned, will be taught."